

What is claimed is:

- 1. A method of identifying an agent effective in treating weight disorders dependent on fat accumulation, said method comprising the steps of:
i) incubating S6 kinase with a compound;
ii) detecting S6 kinase activity; and
iii) determining a compound-induced modulation in the S6 kinase activity relative to when said compound is absent, wherein an alteration of the S6 kinase activity in the presence of the compound is indicative of an agent effective in treating weight disorders dependent on fat accumulation.**
- 2. The method according to claim 1, wherein said modulation is inhibition of S6 kinase 1 activity and said weight disorder is obesity or an overweight condition.**
- 3. The method according to claim 1, wherein said modulation is activation of S6 kinase 1 activity and said weight disorder is an underweight condition resulting from insufficient fat accumulation.**
- 4. The method of any one of the preceding claims, comprising determining S6 kinase activity using S6 as a substrate.**
- 5. The method of claims 1 to 3, comprising determining S6 kinase activity using a peptide substrate.**
- 6. A method of screening for an agent effective in treating weight disorders, the method comprising (a) contacting transcriptionally active cellular components with a nucleic acid encoding an S6 kinase gene operably linked to a promoter sequence or an S6 kinase promoter sequence**

operably linked to a reporter gene in the presence of at least one compound; and (b) detecting an effect of said compound on S6 kinase expression or S6 kinase promoter activity, wherein detection of a decrease or an increase in S6 kinase expression or promoter activity is indicative of an agent effective in treating weight disorders dependent on fat accumulation.

7. The method of claim 6, wherein said transcriptionally active cellular components and said nucleic acid is present in a cell.
8. The method of claim 6 or 7, wherein said S6 kinase is S6 kinase 1.
9. The method of any one of the preceding claims, further comprising detecting an effect on fat accumulation, fat metabolism or adipocyte size by said agent.
10. An agent identified by any one of the preceding claims.
11. A method of reducing adipocyte size, said method comprising contacting an adipocyte with an effective amount of an inhibitor that preferentially reduces S6 kinase 1 activity compared to S6 kinase 2.
12. A method of treating or preventing a weight disorder dependent on fat accumulation, comprising administering to a subject a pharmaceutically effective amount of an S6 kinase modulator.
13. The method of claim 12, wherein said S6 modulator is an inhibitor that preferentially reduces S6 kinase 1 activity compared to S6 kinase 2 and said weight disorder is obesity or an overweight condition.

14. The method of claim 13, wherein said inhibitor binds to an ATP binding site in S6 kinase 1.
15. The method of claim 13, wherein said inhibitor binds to a catalytic domain of S6 kinase 1.
16. The method of claim 13, wherein said inhibitor is an antibody or antibody fragment specific for S6 kinase 1.
17. The method of claim 13, wherein said inhibitor is an antisense, ribozyme or siRNA that preferentially reduces expression of S6 kinase 1 compared to S6 kinase 2.
18. Use of a modulator of S6 kinase for the manufacture of a medicament for the treatment or prophylactic treatment of a weight disorder dependent on fat accumulation.
19. Use of an agent that preferentially inhibits S6 kinase 1 activity compared to S6 kinase 2, for the manufacture of a medicament for the treatment or prophylactic treatment of an overweight condition dependent on fat accumulation or obesity.
20. Use of an agent that preferentially inhibits S6 kinase 1 activity compared to S6 kinase 2, for the manufacture of a medicament for the treatment or prophylactic treatment of a cancerous condition in an overweight or obese individual.
21. The use according to claim 19 or 20, wherein said agent is an antisense molecule, a ribozyme, an siRNA, an antibody or fragment thereof.

22. An at least partially double stranded RNA comprising a nucleic acid sequence of AGUGUUUGACAUAGACCUG (SEQ ID NO:1) or AAGGGGGCUAUGGAAAGGUUU (SEQ ID NO:2) for use as a medicament.
23. A method of diagnosing a predisposition to a weight disorder dependent on fat accumulation, comprising:
- obtaining a sample from an individual,
 - detecting the level of S6 kinase activity in said sample, and
 - correlating a change in S6 kinase activity when compared to a normal control value or range of values with a predisposition to a weight disorder dependent on fat accumulation.
24. The method of claim 23, wherein said S6 kinase activity is S6 kinase 1 activity.
25. The method of claim 24, wherein said change is an increase in S6 kinase 1 activity when compared to a normal control value or range of values and said weight disorder is an overweight condition or obesity.
26. A kit comprising at least one adipocyte and a means for detecting S6 kinase activity.